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Kazumasa Ikushima

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EXAMINER

LEGESSE, HENOK D

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/565,504	Applicant(s) IKUSHIMA, KAZUMASA	
	Examiner HENOK LEGESSE	Art Unit 2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 December 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>01/26/2009</u> . | 6) <input checked="" type="checkbox"/> Other: <u>2 Foreign references (WO 91/16977 & JP2003126750).</u> |

DETAILED ACTION

Claim Objections

1. Claim 5 is objected to because of the following informalities: in claim 5, line 10 the in the term “a nozzle in communication with the in communication with discharge vale” the underlined term “with the in communication” should be cancelled. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3,5-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suovaniemi et al. (US 5,343,769) in view of Suovaniemi (WO 91/16977) and Lewis et al. (US 5,927,560).

Regarding claim 1, Suovaniemi et al ('769) teaches a method of discharging a liquid droplet comprising:

providing a liquid discharging apparatus (device in figs.1, 2, 4) comprising:

a metering tube (the bottom half portion of 6 where plunger 4 closely fit in fig.2) having a columnar internal space formed substantially the same diameter,

a plunger (4) whose tip face closely contacts an inner wall surface of the metering tube (fig.2),

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Suovaniemi et al ('769) further teaches steps of supplying the metering tube (6) with the liquid material by moving the plunger (4) rearward to a first position (by the suction steps A1,B1,C1,.. in fig.5); and moving the plunger (4) forward from a first position and stopping the plunger at a second position thereby discharging a first droplet from the nozzle (by the dispensing steps A,B,C,.. in fig.5); controlling (using the controller 13 in fig.4) moving speed of the plunger (4) during steps of deceleration, acceleration, and constant speed (see figs.3-5 and the related text).

Suovaniemi et al ('769) does not explicitly teaches a storage container filled with the liquid material, a flow passage communicating the metering tube with the storage container, a liquid material supplying valve on the flow passage, a discharge valve disposed at a nozzle side distal end of the metering tube, and a nozzle in communication with the discharge valve. Even though the apparatus of Suovaniemi et al is enabling to do repeated steps shown in figure 5, Suovaniemi et al doe not explicitly discusses method of moving the plunger forward from the second position and stopping the plunger at a third position thereby discharging a second droplet from the discharge port, wherein the liquid material supplied in the metering tube in a single supplying step is discharged from the discharge port in a plurality of steps of moving the plunger forward (i.e. method steps of dispensing the liquid in the metering tube with a plurality of moving-stopping of the plunger).

However, from the same field of endeavor Lewis et al teaches method of discharging a liquid (figs.1,4) including; a storage container (12) filled with the liquid material (25), a flow passage (figs.1,4) communicating the metering tube (26,35) with

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the storage container (12), a liquid material supplying valve (16) on the flow passage, a discharge valve (16) disposed at a nozzle (18) side distal end of the metering tube, and a nozzle (18) in communication with the discharge valve (16, note that valve 16 is three portion four way valve i.e. it can selectively opens one passage while opening the other passage),

Suovaniemi ('136) further from the same field of endeavor teaches method of discharging a liquid droplet (fgis.1-5) comprising: providing a liquid discharging apparatus (fig.1) comprising: a metering tube (1) having a columnar internal space formed substantially the same diameter, a plunger (2) whose tip face closely contacts an inner wall surface of the metering tube (1), controlling units (5,6). Suovaniemi further teaches method of dispensing liquid from metering tube (1) with a plurality of steps (1-6 in fig.4) where each step includes steps of moving by accelerating (A), moving at constant speed (B), decelerating (D) to stop (see also the secondary step T) and continuing the steps a number of times till the required amount is dispensed. Note also the ejection batches 1-6 in fig.4 are identical which means the ejection drops are equal (see figs.1-5 and all the related texts).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include to include storage container and valve and to modify the driving steps of the liquid discharging device of Suovaniemi et al ('769) based on the teachings of Lewis et al and Suovaniemi ('136). The motivation being to provide liquid discharging that can perform ejection for long time with out interruptions, to provide liquid container that can be used for mixing liquids, also to provide a

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discharging device with accurate, speed and reproducible dispensing. Note also the opening and closing of valves to open or close certain flow path is obvious even inherent in order to perform for instance an ejection of liquid.

Regarding claim 2, Lewis et al further teaches air bubble removing means, air vent, can be provided in the plunger to vent out trapped air bubbles (col.3, lines 1-2, col.6, lines 1-2).

Regarding claim 3, Suovaniemi et al ('769) as modified by Lewis et al and Suovaniemi ('136) above further teaches the liquid droplet discharged /dispensed by the method of discussed in claims 1 above, inherently is dispensed on a droplet receiving element/body/work (also see substrate 20 in fig.1 of Lewis et al).

Regarding claim 5, Suovaniemi et al ('769) as modified by Lewis et al and Suovaniemi ('136) as applied above further teaches an apparatus (figs.1,2,4,5 of Suovaniemi et al '769; fig.1 of Suovaniemi '136; figs.1,4 of Lewis et al) for discharging a liquid material, comprising:

a metering tube (lower portion of 6 of Suovaniemi et al '769; 1 of Suovaniemi '136) having a columnar internal space formed substantially the same diameter; a plunger (4 of Suovaniemi et al '769; 2 of Suovaniemi '136) whose tip face closely contacts an inner wall surface of the metering tube (6,1); a storage container (12 of Lewis et al) filled with the liquid material; a flow passage (flow passages in the modified

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device) communicating the metering tube with the storage container (12); a liquid material supplying valve (16 of Lewis et al) on the flow passage; a discharge valve (16) disposed at a nozzle side distal end of the metering tube (6,1); and a nozzle (figs.1,2, of Suovaniemi et al '769; 4 of Suovaniemi '136; 18 of Lewis et al) in communication with the discharge valve (16); and

a controller (13 of Suovaniemi et al '769; 5,6 of Suovaniemi '136) controlling a rearward movement process (A1,B1,C1,.. in fig.5 of Suovaniemi et al '769; similarly in figs. 3,4,5 of Suovaniemi '136) of the plunger to a first position while the liquid material supplying valve (16) is in the open position and the discharge valve (16) is in the closed position, and a forward movement process of the plunger (4,2) from a first position to a second position to discharge a first droplet, and from the second position to a third position to discharge a second droplet, while the liquid material supplying valve is in the closed position and the discharge valves is in the open position, thereby the liquid material supplied in the metering tube in a single supplying step is discharged from the nozzle in a plurality of steps of moving the plunger forward, wherein the controller controls a moving speed of the plunger from a start of a deceleration to a stop of the plunger in the steps of moving forward and stopping the plunger such that a of the first droplet and the second droplet are of the same quantity (see fig.5 and its related texts of Suovaniemi et al '769; and figs1-5 and its related texts of Suovaniemi '136).

Regarding claim 6, Suovaniemi et al ('769) as modified by Lewis et al and Suovaniemi ('136) above further teaches input device (detector 14 in fig.4 which

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includes sensors 23 and 24 in fig.3 of Suovaniemi et al '769; 5,6 of Suovaniemi '136) indicating the moving speed of the plunger (4 in fig.2, col.4, lines 40-44 of Suovaniemi et al '769; 2 of Suovaniemi '136) moving forward from start of deceleration to stop to the controller (13 in fig.4 of Suovaniemi et al '769) (detector 14 including sensors 23,24 measures the position and / or movement of plunger 14, col.3 lines 59-61. see also figs.4, 5 and the corresponding text of Suovaniemi et al '769; and figs1-5 and its related texts of Suovaniemi '136).

Regarding claim 7, Suovaniemi et al ('769) as modified by Lewis et al and Suovaniemi ('136) above further teaches the controller (13 of Suovaniemi et al '769; 5,6 of Suovaniemi '136) controls the operation of the plunger (4,2) on the basis of data concerning the moving speed of the plunger (4,2) moving forward from start of deceleration to stop, which has been inputted by the input means (14, 23, 24 figs.3, 4, col.4, lines 18-68 of Suovaniemi et al '769; figs.2-5 of Suovaniemi '136).

Regarding claims 8 and 10, Suovaniemi et al ('769) as modified by Lewis et al and Suovaniemi ('136) above further teaches wherein the plunger (4 of Suovaniemi et al '769; 2 of Suovaniemi '136) is moved by a motor (electric motor 8, fig.3 of Suovaniemi et al '769) and controlling moving speed of the plunger (4,2) by controlling a rotation of operation of the motor (8) (see fig.4, and the corresponding text of Suovaniemi et al '769).

Regarding claim 9, Suovaniemi et al ('769) as modified by Lewis et al and Suovaniemi ('136) above further teaches wherein the plunger having an air bubble removing means (plunger of Suovaniemi as modified by the air vent of Lewis et al, see the rejection of claim 2 above).

Regarding claim 11, Suovaniemi et al ('769) as modified by Lewis et al and Suovaniemi ('136) above further teaches wherein the step of controlling (see fig.4 of Suovaniemi et al '769) moving speed of the plunger (plunger 4) comprises the steps of: a) starting and accelerating forward movement of the plunger (4) (fig.5; col.5, lines 47-50, 59-68 during liquid dispensing initially the plunger starts to move and accelerates as shown by step A in fig.5 under the control of controller 13 in fig.4); b) keeping the forward movement of the plunger (4) at a constant speed (step B in fig.5); c) decelerating and stopping the plunger (4) (step C in fig.5), wherein the plunger (4) is moved by a regulated amount (regulated by controller 13 in fig.4) (see also figs.3-5 of Suovaniemi '136).

4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suovaniemi et al ('769) as modified by Lewis et al and Suovaniemi ('136) above and further in view of Horsnell et al. (US 2005/0231553).

Regarding claim 12, Suovaniemi et al ('769) as modified by Lewis et al and Suovaniemi ('136) substantially the claimed inventions (see the rejections of claims 1 and 11 above, see also the ejection step w in fig.4 of Suovaniemi '136).

Suovaniemi et al ('769) as modified by Lewis et al and Suovaniemi ('136) do not explicitly teach method of discharging a liquid droplet including a step of a) starting and accelerating forward movement of the plunger; b) decelerating and stopping the plunger without keeping the forward movement at a constant speed, wherein the plunger is moved by a regulated amount.

However, from the same endeavor Horsnell et al teaches method of discharging a liquid droplet (figs.1,5,10,16) including a step of a) starting and accelerating forward movement of the plunger (due to the application of the first portion of the driving wave forms in figs.16a,16b); b) decelerating and stopping the plunger without keeping the forward movement at a constant speed, wherein the plunger is moved by a regulated amount (due to the application of the second portion of the driving wave forms in figs.16a,16b, and the movement of the plunger such as 1 in fig.1 is controlled by controller in figs.10,16. see also paragraph 0165).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the driving of the liquid discharging device of Suovaniemi et al ('769) as modified by Lewis et al and Suovaniemi ('136) to include the steps of driving as taught by Horsnell et al in order to be able to eject small droplets while suppressing the formation of satellite droplets.

Response to Arguments

5. Applicant's arguments with respect to claims 1-12 have been considered but are moot in view of the new ground(s) of rejection.

Pertinent Prior Art

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Osawa et al (US 2001/0016358), Sato (US 6,230,606), Eslinger (US 4,990,058), Moler et al. (US 7,021,191), Hanafusa et al. (US 2006/0144331), Ikushima (JP 2003126750), Fischer (US 6,283,946).

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HENOK LEGESSE whose telephone number is (571)270-1615. The examiner can normally be reached on Mon.- Fri. Between. 8:00 AM-6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MATTHEW LUU can be reached on (571)272-7663. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MATTHEW LUU/
Supervisory Patent Examiner, Art Unit 2861

H.L.
04/10/2009